GMGCD-A

STANDARD, PHASE ANGLE

1. GENERAL. This procurement requires a phase angle standard with operator variable parameters and remote operability.

2. CLASSIFICATION. Type II, Class 5, Style E and Color R in accordance with MIL-T-28800 for shipboard applications with the following exceptions:

a. Warm-up time is extended to 30 minutes.
b. The operating temperature range is limited to 10 to 40 degrees C.

2.1 Electromagnetic interface requirements. The requirements of MIL-T-28800 are limited to CE01, CE03, CS01, CS02 (0.05 to 100 MHz), CS06, RE01 (back panel search excluded), RE02 (14 kHz to 1 GHz), and RS03.

3. OPERATIONAL REQUIREMENTS. The equipment shall be capable of generating two sinusoidal waveforms with variable phase shift and amplitude in accordance with the following minimum specifications.

3.1 Phase angle.

3.1.1 Phase range. -180 to +360 degrees.

3.1.2 Phase resolution. 0.005 degrees or less.

3.1.3 Phase uncertainty. The phase angle uncertainty shall be in accordance with table I.

TABLE I. Phase Uncertainty (degrees)

Amplitude (VRMS) 5V (R=1)	**1 Hz - 1 kHz** **5**	**1 - 6.25 kHz** **5**	**6.25 - 50 kHz** **10**	**50 - 100 kHz** **20**
50 mV - 100V	5 + 0.05R	10 + 0.1R	15 + 0.15R	40 + 0.4R
100V - 120V	10 + 0.1R	20 + 0.2R	30 + 0.3R	100 + R
NoteR is the ratio of the larger output voltage to the smaller output voltage and covers the range of 1 to 25.				

3.1.4 Phase stability. ±0.005 degrees up to 50 kHz, ±0.01 degrees above 50 kHz for at least 20 minutes.

3.2 Signal frequency.

3.2.1 Frequency range. 2 Hz to 100 kHz.

3.2.2 Frequency resolution. Frequency settability shall be as follows:

a. 1 Hz from 1 Hz to 6250 Hz

b. 10 Hz from 6250 Hz to 50 kHz

c. 20 Hz from 50 kHz to 100 kHz

3.2.3 Frequency uncertainty. ±0.1% of setting.
3.2.4 Frequency stability. ±0.01% for at least 24 hrs.

3.2.5 Frequency output. A TTL compatible frequency output which corresponds to the frequency of the signals shall be available at the rear panel.

3.3 Signal amplitude.

3.3.1 Amplitude range. 50 mVrms to 120 Vrms for each signal.

3.3.2 Amplitude resolution. Amplitude settability shall be as follows:

a. 1 mV from 50 mV to 500 mV

b. 2 mV from 500 mV to 8V

c. 33 mV from 8V to 100V

d. 100 mV from 100V to 120V

3.3.3 Amplitude uncertainty. ±(0.5% of output + 5 Mv) from 2 Hz to 50 kHz, ±(2% of output + 25 mV) from 50 kHz to 100 kHz.

3.3.4 Amplitude stability. ±(0.1% + 1 mV) of setting for at least one hour.

3.4 Total harmonic distortion. 0.05% from 2 to 500 Hz, 0.1% from 500 Hz to 5 kHz, and 0.3% from 5 kHz to 100 kHz.

3.5 Spurious less than noise. -60 dBc for the dc to 100 kHz measurement bandwidth, less than -50 dBc for the 100 kHz to 10 MHz measurement bandwidth.

3.6 Output current. 15 ma minimum for all signal amplitudes.

3.7 Output impedance. 0.5 ohms maximum.

3.8 Connectors. BNC female.

3.9 Auto-zero. Phase errors generated by the equipment shall be compensated for within 90 seconds of operator initiation of the compensation process.

3.10 Display. Phase angle, frequency, reference voltage and variable phase voltage shall be displayed with the proper units (degrees, Hz, etc.) to at least the resolutions in paragraphs 3.1.2, 3.2.2, and 3.3.2.

4. GENERAL REQUIREMENTS.

4.1 Power source. MIL-T-28800 nominal power source requirements are invoked. Operations @400 Hz is not required. Maximum power consumption: 50W.

4.2 Weight. 20 kg (44 lb) maximum.

4.3 Digital interface. Digital interface in accordance with MIL-T-28800.

4.4 Lithium batteries. Per MIL-T-28800, lithium batteries are prohibited without prior authorization. A request for approval for the use of lithium batteries, including those encapsulated in integrated circuits, shall be submitted to the procuring activity at the time of submission of proposals. Approval shall apply only to the specific model proposed.

4.5 Calibration interval. 12 months minimum. End-of-interval confidence factor: 72%.